خصائص التوزيع الطبيعي
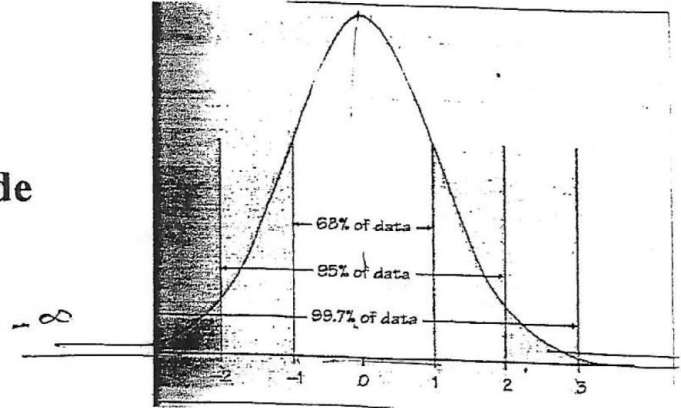# Characteristics of the normal distribution

1-Bell- shaped

2- symmetric

3- the mean = median = mode

4- Unimodal

5- extends to $+\infty$, $-\infty$

6- area under the curve = 1

7- the normal distribution curve can be completely described by mean and standard deviation.

إذا قسمنا مساحة منحنى التوزيع الطبيعي إلى وحدات من الانحراف المعياري فأننا نجد

8-if we divide the normal distribution curve up into standard deviation units , a Known proportion of scores lies Within each portion of the curve as follows:

68% من البيانات تنحصر بين واحد انحراف معياري اصغر من المتوسط الحسابي إلى واحد انحراف معياري أكبر من المتوسط الحسابي.

❀ Almost **68%** of the total area under normal distribution curve lies between:
one standard deviation below" and " **one standard deviation** above" the mean

95% من البيانات تنحصر بين   2 انحراف معياري اصغر من المتوسط الحسابي إلى 2 انحراف معياري أكبر من المتوسط الحسابي،

❀ Almost **95%** of the total area under normal distribution curve lies between:
 two standard deviation below and **two standard deviation** above the mean

99.7% من البيانات تنحصر بين   3 انحراف معياري اصغر من المتوسط الحسابي إلى 3 انحراف معياري أكبر من المتوسط الحسابي.

❀ Almost 99.7% of the total area under normal distribution curve lies between:
 three standard deviation below" and "**three standard deviation** above" the mean.

التوزيع الطبيعي المعياري

Standard Normal Distribution

The **Standard Normal Distribution** follows a normal distribution and has **mean** = 0   and **standard deviation** = 1

Example

1) in the normal distribution curve :
   a) the mean is higher than the median.
   b) the mode is higher than the median .
   c) the mean is equal to the median ..
   d) the median is equal to the standard deviation.
   e) the mean and standard deviation are equal.

   [c]

2) The normal distribution curve can be completely described by :
   a) mean and mode .
   b) standard deviation and range.
   c) variance and median.
   d) median and range.
   e) mean and standard deviation..

   [e]

3) The standard normal distribution has:
   a) a mean of 1 .
   b) a standard deviation of 1 ..
   c) a variance of 0 .
   d) a median of 1 .
   e) a mode of 1

   [b]

4) Almost 95% of the total area under normal distribution curve lies between
   a) " one standard deviation below" and " one standard deviation above" the mean.
   b) " three standard deviation below" and "three standard deviation above" the mean.
   c) " two standard deviation below" and " three standard deviation above" the mean.
   d) " two standard deviation below" and " two standard deviation above" the mean.
   e) " two standard deviation below" and " one standard deviation above" the mean.

   [d]

5) The standard normal distribution :
   a) has a median of 1 .
   b) has a standard deviation of 0 .
   c) has a variance of 0 .
   d) has a mean of 0 ..
   e) has a mode of 1 .

   [d]

6) This figure shows two standard normal distribution curves (A , B)
   a) Mean in curve (A) is more than that in curve (B).
   b) Mean in curve (A) is less than that in curve (B).
   c) Standard deviation in curve (A) is less than that in curve (B).
   d) Standard deviation in curve (A) is more than that in curve (B).
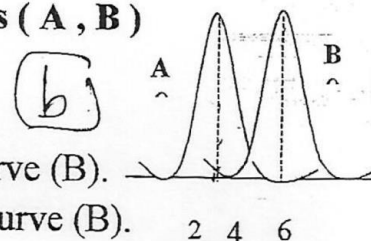   e) Standard deviation in curve (A) = that in curve (B).
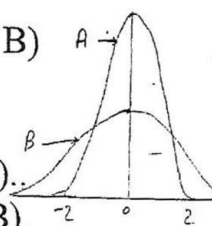
7) The normal distribution curve is NOT:
   a) bell – shaped .
   b) symmetric .
   c)   bimodal..
   d) having its total area equal 1.0 .
   e) extending from $(-\infty)$ to $(+\infty)$.

(8) Thus figure shows two normal distribution curves (A , B)
a) Mean in curve (A) is more than that in curve (B).
b) Mean in curve (A) is less than that in curve (B)..
c) Standard deviation in curve (A) is less than that in curve (B).
d) Standard deviation in curve (A) is more than that in curve (B).
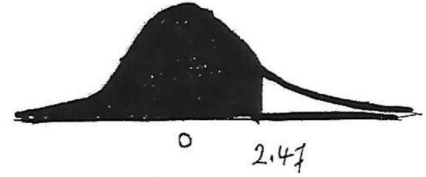e) Mean in curve (A) = Mean in curve (B).

Problem 1 : Find P ($Z < 2.47$) **less**, below

Answer 1 نوجد القيمة من الجدول مباشراً

$0.9932 =$ تقابل عمود 0.07 2.4 $\leftarrow$ 2.47
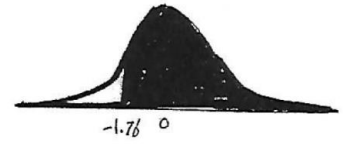

Problem 2 : Find P ($Z > -1.76$) **above** فوق

Answer 2 $(Z > -1.76) = 1 - (Z < -1.76)$

نوجد القيمة من الجدول ثم نطرحها من 1

نوجد القيمة من الجدول مباشراً
ثم نطرحها من 1

$= 1 - (0.0392)$

$= 0.9608$

Problem 3 : Find P ($-1.76 < Z < 2.47$) **between**

Answer 3 P ($-1.76 < Z < 2.47$) = P($Z < 2.47$) $-$ P($z < -1.76$)

نوجد القيم من الجدول ونطرحها مباشراً

الجردلية الكبيرة   الجردلية الصغيرة

$= 0.9932 - 0.0392$

$= 0.954$

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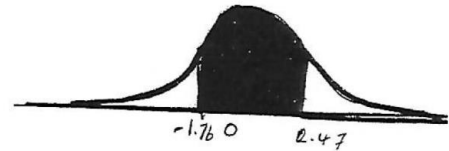
less يعطيك أو اذا لم تذكر نأخذ القيمة من الجدول

above نطرح القيمة من 1

Example

The following statement applies for

> **Fasting blood glucose has a mean of 100 mg%   and a standard deviation 9 mg%.**

(mean is marked with $\overset{X}{}$ above it)

1) A person whose fasting blood glucose s **129** mg % has a Z- score =

   a)   1.92
   b)   2.01
   c)   2.18
   d)   3.22
   e)   None of the above is correct

$$Z = \frac{129 - 100}{9} = 3.22$$

$$\boxed{d}$$

$$\boxed{Z = \frac{X - \bar{x}}{s}}$$

القانون ←

2) A person whose fasting blood glucose `s **81** mg % has a Z- score =

   a)   1.92
   b)   2.01
   c)   2.18
   d)   -2.11
   e)   None of the above is correct

$$\boxed{d} \quad Z = \frac{81 - 100}{9} = -2.11$$

3 If we examined 10000 persons the number of persons with fasting blood
Glucose **above** 120% mg =

   a)   98.68
   b)   132
   c)   321
   d)   9868
   e)   None of the above is correct

كم شخص نسبة أعلى من 120

① نوجد Z

$$\boxed{b} \quad Z = \frac{120 - 100}{9} = 2.22$$

② من الجدول

$$2.22 \rightarrow \boxed{0.9868} \quad نطرحها من (1)$$

$$1 - 0.9868 = \boxed{0.0132}$$

تقرب ×10000

4 If we examined 10000 persons the number of persons with fasting blood
Glucose **Less** 120% mg =

   a)   98.68
   b)   132
   c)   321
   d)   9868
   e)   None of the above is correct

$$Z = \frac{120 - 100}{9} = 2.22$$

الجدول = 0.9868 تضرب في 10000

$$= 0.9868(10000)$$

$$= 9868$$

Example

1) the area under the normal curve corresponding to Z- score of 1.71 is :
   a)   0.8800
   b)   0.0436
   c)   0.9564
   d)   0.0764
   e)   None of the above is correct

جدول الموجب

نوجد القيمة الجدولية لـ

من الجدول 0.9564

حدول السالب

2) the area under the normal curve corresponding to Z- score of -1.43 is :
   a)   0.8800
   b)   0.0436
   c)   0.9564
   d)   0.0764
   e)   None of the above is correct

d

$= 0.0764$

3) the area under the normal curve corresponding to Z- score **between**
   -1.43 and 1.71 is :
   a)   0.8800
   b)   0.0436
   c)   0.9564
   d)   0.0764
   e)   None of the above is correct

$A = 0.9564 - 0.0764$

a $= 0.88$

نطرح

4) the area under the normal curve corresponding to Z- score of **above** -1.43 is :
   a)   0.8800
   b)   0.0436
   c)   0.9236
   d)   0.0764
   e)   None of the above is correct

$A = 1 - 0.0764 =$

$= 0.9236$

c

Example

$\overline{x}$

S

$$\mu = 100 \, mg\% \qquad , \sigma = 12 \, mg\%$$

(1) A person FBG 1s $133 mg\%$ has a Z-score is

a) 1.92 .

b) 2.75 ..

c) -2.18 .

d) -2.33 .

e) None of the above is correct .

$$Z = \frac{x - \overline{x}}{s} = \frac{x - \mu}{\sigma}$$

$$Z = \frac{133 - 100}{12} = 2.75$$

b

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(2) A person whose FBG 1s 79 mg% has a Z-score whose is

a) 1.92 .

b) -1.75 ..

c) 2.18 .

d) 1.75 .

e) None of the above is correct .

Z

$$Z = = \frac{79 - 100}{12} = -1.75$$

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(3) In group of 10000 persons the number of those with FBG **above** 133mg% is

a) 99 .

b) 9970 .

c) 1 .

d) 30 ..

e) 100 .

d

$$z = \frac{133 - 100}{12} = 2.75 \to 0.9970 =$$
$$1 - 0.9970 = .0003 \times 10000 = 30$$

less

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(4)) In group of 10000 persons the number of those with FBG **below** 79mg% is

a) 99 .

b) 9970 .

c) 1 .

d) 301 .

e) 401 ..

$$z = \frac{79 - 100}{12} = -1.75 \to 0.0401 \times 10000 = 401$$

e

(5) In group of 10000 persons the number of those with FBG 79-133mg%is

a) 9569 .

b) 9970 .

c) 1.

d) 301.

$\leq 10000 - (401 + 30) = 9569$

e) None of the above is correct .

$10000 - (401 + 30)$
$= 9569$

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(6) The percentage of those who have with FBG <u>below</u> 133mg% is:

a) 88.00 % .

b)   8.80 % .

c)   99 .7 % .. $\bigcirc$ C

d)   7 . 64 % .

e) None of the above is correct .

$z = \dfrac{133-100}{12} = 2.75 \rightarrow 0.9970 \times$
$100 = 99.7\%$

نضرب في 100 الاجابة %

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(7) The percentage of those with FBG <u>above</u> 79mg% is:

a) 12. 9% .

b) 95.99% .

c) 4.01% .

d) 19.2 % .

e) None of the above .

$z = \dfrac{79-100}{12} = -1.75 \rightarrow 0.0401$
$1 - 00401 = 0.9599 \times 100 = 95.99\%$